

IN THE CLAIMS:

Claim 1 (original): A surface acoustic wave device comprising a piezoelectric substrate and an IDT that is formed on said piezoelectric substrate and is made from Al or alloy including Al as a main component, an excited wave being an SH wave, wherein

said piezoelectric substrate is a quartz flat plate where a cut angle θ of a rotation Y cut quartz substrate is set in a range of $-64.0^\circ < \theta < -49.3^\circ$ in a counterclockwise direction from a crystal Z-axis, and a propagation direction of a SAW is set to $(90^\circ \pm 5^\circ)$ to a crystal X-axis, and when a wavelength of the SAW to be excited is represented as λ , an electrode film thickness H/λ standardized by a wavelength of said IDT is set to satisfy $0.04 < H/\lambda < 0.12$.

Claim 2 (original): The surface acoustic wave device according to claim 1, wherein a relationship between the cut angle θ and the electrode film thickness H/λ satisfies -
 $1.34082 \times 10^{-4} \times \theta^3 - 2.34969 \times 10^{-2} \times \theta^2 - 1.37506 \times \theta - 26.7895 < H/\lambda < -1.02586 \times 10^{-4} \times \theta^3 - 1.73238 \times 10^{-2} \times \theta^2 - 0.977607 \times \theta - 18.3420$.

Claim 3 (original): The surface acoustic wave device according to claim 1, wherein, when an electrode finger width of electrode fingers constituting said IDT/(electrode finger width + space between electrode fingers) is defined as a line metalization ratio mr , a relationship between the cut angle θ and a product $H/\lambda \times mr$ of the electrode film thickness and the line metalization ratio satisfies $-8.04489 \times 10^{-5} \times \theta^3 - 1.40981 \times 10^{-2} \times \theta^2 - 0.825038 \times \theta - 16.0737 < H/\lambda \times mr < -6.15517 \times 10^{-5} \times \theta^3 - 1.03943 \times 10^{-2} \times \theta^2 - 0.586564 \times \theta - 11.0052$.

Claim 4 (original): A surface acoustic wave device comprising a piezoelectric substrate and an IDT that is formed on said piezoelectric substrate and is made from Al or alloy including Al as a main component, an excited wave being utilized as an SH wave, wherein

said piezoelectric substrate is a quartz flat plate where a cut angle θ of a rotation Y cut quartz substrate is set to satisfy a range of $-61.4^\circ < \theta < -51.1^\circ$ in a counterclockwise direction from a crystal Z-axis, and a propagation direction of a SAW is set to $(90^\circ \pm 5^\circ)$ to a crystal X-axis, and

when a wavelength of the SAW to be excited is represented as λ , an electrode film thickness H/λ standardized by a wavelength of the IDT is set to satisfy $0.05 < H/\lambda < 0.10$.

Claim 5 (original): The surface acoustic wave device according to claim 4, wherein a relationship between the cut angle θ and the electrode film thickness H/λ satisfies -
 $1.44605 \times 10^{-4} \times \theta^3 - 2.50690 \times 10^{-2} \times \theta^2 - 1.45086 \times \theta - 27.9464 < H/\lambda < -9.87591 \times 10^{-5} \times \theta^3 - 1.70304 \times 10^{-2} \times \theta^2 - 0.981173 \times \theta - 18.7946$.

Claim 6 (original): The surface acoustic wave device according to claim 4, wherein when an electrode finger width of electrode fingers constituting said IDT/(electrode finger width + space between electrode fingers) is defined as a line metalization ratio mr , a relationship between the cut angle θ and a product $H/\lambda \times mr$ of the electrode film thickness and the line metalization ratio satisfies $-8.67632 \times 10^{-5} \times \theta^3 - 1.50414 \times 10^{-2} \times \theta^2 - 0.870514 \times \theta - 16.7678 < H/\lambda \times mr < -5.92554 \times 10^{-5} \times \theta^3 - 1.02183 \times 10^{-2} \times \theta^2 - 0.588704 \times \theta - 11.2768$.

Claim 7 (original): The surface acoustic wave device according to any one of claims 1 to 6, wherein

said surface acoustic wave device is a one-port surface acoustic wave resonator where at least one IDT is disposed on said piezoelectric substrate.

Claim 8 (original): The surface acoustic wave device according to any one of claims 1 to 6, wherein

said surface acoustic wave device is a two-port surface acoustic wave resonator where at least two IDTs are disposed along a propagation direction of a surface acoustic wave on said piezoelectric substrate.

Claim 9 (original): The surface acoustic wave device according to any one of claims 1 to 6, wherein

said surface acoustic wave device is a lateral coupling type multi-mode filter where a plurality of surface acoustic wave resonators are disposed in proximity to each other in

parallel with a propagation direction of a surface acoustic wave on said piezoelectric substrate.

Claim 10 (original): The surface acoustic wave device according to any one of claims 1 to 6, wherein

said surface acoustic wave device is a vertical coupling type multi-mode filter where two-port surface acoustic wave resonators comprising a plurality of IDTs are disposed along a propagation direction of a surface acoustic wave on said piezoelectric substrate.

Claim 11 (original): The surface acoustic wave device according to any one of claims 1 to 6, wherein

said surface acoustic wave device is a ladder type surface acoustic wave filter where a plurality of surface acoustic wave resonators are connected on said piezoelectric substrate in a ladder shape.

Claim 12 (original): The surface acoustic wave device according to any one of claims 1 to 6, wherein

said surface acoustic wave device is a transversal SAW filter where a plurality of IDTs propagating a surface acoustic wave bidirectionally are disposed on said piezoelectric substrate at predetermined intervals.

Claim 13 (original): The surface acoustic wave device according to any one of claims 1 to 6, wherein

said surface acoustic wave device is a transversal SAW filter where at least one IDT propagating a surface acoustic wave in one direction is disposed on said piezoelectric substrate.

Claim 14 (original): The surface acoustic wave device according to any one of claims 1 to 6, wherein

said surface acoustic wave device is a surface acoustic wave sensor.

Claim 15 (currently amended): The surface acoustic wave device according to any one of claims 1 to ~~[[14]]~~ 6, wherein

said surface acoustic wave device has grating reflectors on both sides of an IDT.

Claim 16 (currently amended): A module device or an oscillation circuit using the surface acoustic wave device according to any one of claims 1 to ~~[[15]]~~ 6.